Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

When to Cut Rice

LIBRARY
JAN 7 -
AGRICULTURAL ECONOMICS
U. S. DEPARTMENT OF AGRICULTURE

LEAFLET No. 148
U. S. DEPARTMENT OF AGRICULTURE

1. Rice must be of high milling quality to command a premium price.

2. For high milling quality, rice must be cut at the proper stage of maturity.

3. The proper stage of maturity to obtain high milling quality and maximum acre yields is when the rice contains from 23 to 28 percent of moisture.

4. Tests should be made to determine the moisture content.

5. Rice growers can obtain moisture tests at warehouses, mills, inspection laboratories, and growers' association laboratories.

Washington, D. C. Issued December 1937

WHEN TO CUT RICE

By W. D. Smith, *senior marketing specialist, Bureau of Agricultural Economics,* and Jenkin W. Jones, *senior agronomist, Division of Cereal Crops and Diseases, Bureau of Plant Industry.*

Profit in growing rice comes largely from producing a good yield per acre of rice that is of high milling quality and comparatively free of defects. The use of the best recommended farm-management practices with respect to seedbed preparation, seed selection, and the irrigation and drainage of fields is necessary if high yields and high milling quality are to be obtained. Of even greater importance with respect to milling quality is to cut the rice at the proper stage of maturity.

If the crop is harvested when immature, the yields per acre will be reduced and breakage in milling will be excessive, because of the presence of light, chalky kernels. Breakage in milling may also be excessive if the rice is harvested too late, that is, after the proper stage of maturity for harvesting has passed; even though yields per acre may not be reduced except by shattering, many of the kernels often are brittle or cracked.

Some rice is harvested purposely before it has reached the proper stage of maturity, because the growers desire to sell at the premium price that is paid by mills in some seasons for the first lots of rice harvested. At other times, growers harvest too early because they are anxious to complete harvesting while the weather is favorable before bad weather comes. Much rice is harvested each season either too early or too late to produce rice of high milling quality because a definite method is not used to determine when it should be cut.

Milling Quality as Important as Numerical Grade

The commercial value of a lot of rice depends largely upon its milling quality. The term "milling quality", as used in the rice trade and in the official standards for rough rice, refers to the percentage of whole kernels and of total milled rice that can be obtained under average milling conditions from a given quantity of rough rice. Rough rice that gives a high percentage of whole kernels together with a high percentage of total rice when milled is said to be of high milling quality. Buyers of rough rice give more consideration to the milling quality than to any other single factor.

When a lot of rough rice that has been produced in the Southern States is graded according to the United States standards it is first classified as to variety or type, and it is then assigned a numerical grade based on factors other than milling quality. The milling quality is then determined and stated as a part of the grade designation.

Two lots of rough rice that are graded No. 1 may differ substantially in market value because of a difference in milling quality. A lot of rice that is graded No. 2 may even be of higher milling quality and of higher market value than a lot of rice that is graded No. 1. The high milling quality of the No. 2 lot may more than offset, in market value, the defects that cause the rice to be graded No. 2. Growers, therefore, should attempt to produce rice that is of high milling quality as well as of high numerical grade.

It is an established fact that the moisture content of rice at the time of milling largely determines the yield of whole kernels. The milling quality, as a general rule, improves as the moisture content of the rough rice decreases to about 14 percent. To obtain the best results the moisture content should be reduced gradually. If rice is dried much below 14 percent it is difficult to remove the bran from the kernel in milling. Such rice has to be scoured severely and this causes excessive breakage.

Determining the Best Time to Harvest

The most troublesome problem connected with producing a crop of rice has been the determination of the proper stage of maturity at which the rice should be cut to produce maximum acre yields of high milling quality.

To determine the proper time to harvest rice, as exactly as possible, a series of investigations was conducted by the Department of Agriculture. The Bureau of Agricultural Economics made a study on farms during the harvest seasons of 1931 and 1932 in Texas, of 1933 in Louisiana, and of 1935 in Arkansas. Cooperative studies were conducted by the Bureau of Plant Industry at the Rice Branch Experiment Station, Stuttgart, Ark., and Texas Agricultural Substation No. 4, Beaumont, Tex., during the 3-year period 1932–34.

The varieties of rice on which the investigations were conducted by the two Bureaus and the State agricultural experiment stations were Caloro, Blue Rose, Supreme Blue Rose, Edith, Shoemed, Fortuna, Rexoro, Early Blue Rose, and Early Prolific.

The determinations were made by harvesting samples beginning when the rice was distinctly immature and continuing until after it was fully ripe. These samples showed a distinct improvement in milling quality as the rice came to maturity and showed the bad effects of allowing the rice to stand uncut too long. Each sample was tested for moisture content on the day that it was harvested but was allowed to cure properly before being tested for milling quality. The milling-quality tests were made when the moisture content of each sample was approximately 14 percent. It was found that the moisture content of the kernels of the standing rice was a good index of maturity and of the milling quality of the rice after it was cut and cured.

Some of the samples harvested in the early stages contained as much as 50 percent of moisture. It was found that during this period the loss of moisture from the standing rice is very rapid when atmospheric conditions are favorable. On warm dry days the moisture escapes from the rice rapidly, but on rainy days and days of high humidity, the loss of moisture is greatly retarded or entirely stopped. After the rice has reached the stage where the moisture content is

comparatively low, the kernels may even take up moisture on rainy days and on days of high humidity. In some seasons, when rainy or very humid weather is encountered at harvest time, the milling quality of rice left uncut is not affected adversely so much as it is in harvest seasons when hot, dry, sunny weather prevails. When the loss of moisture from the standing rice is retarded by atmospheric humidity, and when the rice is not subjected to hot sunshine, the rice hardens slowly, in a manner similar to the curing that takes place in the shock, and the kernels are not cracked by the sudden strains that are often created in the kernels by a rapid loss of moisture.

The results of the investigations indicate that, to obtain maximum acre yields of high milling quality, the crop should be harvested when the moisture content of the standing rice ranges from about 23 to 28 percent. Few chalky kernels, because of immaturity, are found in rice that is harvested at this stage of maturity.

Yield Per Acre

That acre yields are reduced greatly by harvesting too soon is shown clearly by the investigations. Kernels of immature rice contain a high percentage of moisture and a low percentage of solid matter. Mature kernels have a relatively low percentage of moisture and a high percentage of solid matter. Immature kernels when dried are light in weight and chalky, but mature kernels when dried are heavy and not chalky. Consequently, rice that is harvested when it is fully mature gives a higher yield per acre than rice that is harvested when it is immature.

The indications are that if rice is harvested at the proper stage of maturity to produce high milling quality, the maximum acre yield usually will be obtained. The acre yield is not usually reduced by letting the rice stand in the field after it has passed the stage of maturity when it should be cut but the milling quality is affected adversely in most cases. Maximum acre yields of high milling quality, the two highly desired objectives, usually are obtained if rice is cut at the proper stage of maturity.

Germination

The percentage of germination was determined for the rice harvested when it was very immature, when it was approaching maturity, and when it was fully ripe. While the rice was very immature the percentage of germination for each variety increased rapidly from day to day; there was only a slight increase from day to day as the rice approached maturity; and thereafter there was no appreciable change in the percentage of germination. As a general rule the percentage of germination reached its maximum just before the rice was sufficiently mature to produce maximum acre yields. Therefore, rice harvested at the proper stage of development to produce good acre yields and high milling quality will be satisfactory for seed purposes so far as germination is concerned.

Practical Use of the Results

The results of the investigations indicate that when a rice crop is harvested at the stage of maturity at which the rice contains from 23 to 28 percent of moisture, good yields per acre of high milling quality

will be produced, and the rice will have a high percentage of germination. It is important, therefore, to start harvesting during this period and to carry the work through quickly, in order that all of the rice will be cut before it becomes overripe.

It is also important that good seed and proper cultural methods be used, in order that the crop will mature evenly. If a crop heads and ripens unevenly, it is impossible to harvest it at any period without some of it being either immature or overripe. Uneven ripening, in some cases, is the result of the use of poor seed, of poor seeding methods, or of improper irrigation.

Inasmuch as the moisture content of the standing rice is the best index of the stage of maturity, it is essential that accurate moisture tests of the rice as it approaches maturity be obtained. Moisture tests can be obtained by growers in almost all sections of the rice-producing areas by taking or sending samples to rice inspection laboratories, rice mills, rice warehouses, and to growers' associations. The moisture tests must be made carefully and accurately if they are to be of any benefit as guides as to the proper time to harvest.

Samples to be tested for moisture content should be obtained from all parts of the plot or field for which the information is desired. The samples should not be collected while dew or rain is on the rice. The samples as they are obtained in the field should be put into cans, glass jars, or other airtight containers to prevent any loss of moisture before they are tested. Each sample should consist of at least a quart of rice, stripped as cleanly as possible from the straw. All of the kernels should be taken from each head that is stripped. If only the kernels from the tip of the head are taken as a sample, a true indication of the stage of maturity of all the rice is not obtained. The kernels near the tip of the head mature before the kernels at the base.

After the crop has been cut it should be well cured before it is stored or marketed. If the rice has been cut with binders it should be shocked promptly and by methods that will protect the rice from bad weather and the direct rays of the sun. Threshing should not be delayed after the rice is well cured. Inasmuch as rice contains from 23 to 28 percent moisture when it is cut at the proper stage of maturity, and since the rice should not contain more than 14 percent of moisture when it is stored or marketed, the curing process for the rice in the shock must continue until there is a reduction of 9 to 14 percent in the moisture content. If rice containing excess moisture (over 14 percent) is stored or marketed, it may heat or become musty, as a result of which its value will be reduced and the price discounted.

Rice in the shock does not lose moisture at the same rate per day in all seasons and for this reason the rule of allowing the rice to remain in shocks a certain number of days cannot be followed. Atmospheric conditions govern the curing of the rice. The degree of humidity in the air is the principal factor that determines the rate at which moisture escapes from the rice. When the atmospheric humidity is low the rice will cure rapidly, but when the atmospheric humidity is high it will take much longer for the rice to cure. Moisture tests also may be used to advantage in determining when shocked rice should be threshed. Samples taken for this purpose should be obtained from several shocks in the field and from the interior bundles in each shock. It is useless to determine accurately when rice should be cut to produce good acre yields of high milling quality and then

ruin the quality of the rice by threshing it too soon. Also, by allowing the rice to remain in shocks too long, there is a needless loss of moisture below 14 percent and a consequent loss in weight.

If, for any reason, rice is threshed before it is properly cured it can be dried artificially. In the case of damp or wet threshed rice the result of the moisture test indicates clearly the percentage of moisture that must be removed from the rice by artificial drying. After each drying operation, accurate moisture tests should be made in order to determine whether additional drying is necessary. When artificial drying is done correctly, with the drying air at the right temperature, the results are entirely satisfactory.

Rice that is carefully grown, harvested at the right time, and cured properly, usually commands a premium on the market.

U. S. GOVERNMENT PRINTING OFFICE: 1937

For sale by the Superintendent of Documents, Washington, D. C. - - - - Price 5 cents